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BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

Application Number: 09/510,053
Filing Date: February 22, 2000
Appellant(s): NIXON ET AL.

Roger Heppermann
For Appellant

EXAMINER'S ANSWER

This is in response to the appeal brief filed on March 27, 2006 appealing from the Office action mailed on September 22, 2005.

(1) Real Party in Interest

A statement identifying the real party in interest is contained in the brief.

(2) Related Appeals and Interferences

The examiner is not aware of any related appeals, interferences, or judicial proceedings which will directly affect or be directly affected by or have a bearing on the Board's decision in the pending appeal.

(3) Status of Claims

The statement of the status of claims contained in the brief is correct.

(4) Status of Amendments After Final

The appellant's statement of the status of amendments after final rejection contained in the brief is correct.

(5) Summary of Claimed Subject Matter

The summary of claimed subject matter contained in the brief is correct.

(6) Grounds of Rejection to be reviewed on Appeal

The appellant's statement of the grounds of rejection to be reviewed on appeal is correct.

(7) Claims Appendix

The copy of the appealed claims contained in the Appendix to the brief is correct.

(8) Evidence Relied Upon

U.S. Patent 5,818,736 to **Leibold** of October 1998.

U.S. Patent 6,377,859 to **Brown et al**. of April 2002.

Admitted prior art.

PCT WO 97/45778 to **Bowling**, of December 1997.

PCT WO 97/38362 to **Santoline et al.** of October 1997.

U.S. Patent 6,192,281 to **Brown et al**. of February 2001.

(9) Grounds of Rejection

The following detailed grounds of rejection are applicable to the appealed claims:

103 Rejections

Claims 1, 6-8, 10-12 and 17-18 are rejected under 35 U.S.C. 103(a) as being unpatentable over **Leibold** (U.S. Patent 5,818,736) in view of **Brown et al.** (U.S. Patent 6,377,859).

(9.1) **Leibold** teaches system and method for simulating signal flow through a logic block pattern of a real time process control system. Specifically, as per claim 1, **Leibold** teaches an apparatus for use with a distributed process control system having a user workstation remotely

located from a distributed controller that controls one or more field devices using control modules (CL1, L24-27; CL1, L33-35; CL1, L38-41; Fig. 3A and 3B); the apparatus comprising:

a computer having a memory and a processing unit (Fig. 3A; Fig. 3B, Items 370, 375 and 385);

a configuration application stored in the memory of the computer which when executed on the user workstation or computer creates one or more control modules for execution by the distributed controller and a further module for execution by a device separated from the distributed controller (CL3, L47-59; Fig. 2, Items 220 and 250; CL1, L38-42; CL9, L53-62; CL10, L7-13; CL10, L17-20); and

a controller application stored in the memory of the computer which may be executed on the processing unit of the computer (CL1, L24-26; CL2, L49-52; CL2, L54-6; CL3, L2-8);

wherein the configuration application, when executed on the computer, further creates the one of the control modules for use by the distributed controller within the distributed process control system (CL3, L47-59; Fig. 2, Item 250; CL9, L53-62; CL10, L7-13; CL10, L17-20).

Leibold teaches that at least one of the control modules is created to communicate with a user interface module to perform a control activity (CL4, L5-10) and with a simulation module to perform simulation (CL2, L49-52; CL2, L54-67; CL3, L2-8; CL9, L19-30). **Leibold** does not expressly teach that at least one of the control modules is created to communicate with the further module within the device separated from the distributed controller to perform a control activity. **Brown et al.** teaches that at least one of the control modules is created to communicate with the further module within the device separated from the distributed controller to perform a

control activity (CL2, L1-25), as that allows devices made by different manufacturers to interoperate, the process control to be decentralized and the distributed control systems to be simplified (CL2, L14-18). It would have been obvious to one of ordinary skill in the art at the time of Applicants' invention to modify the apparatus of **Leibold** that included at least one of the control modules being created to communicate with a user interface module to perform a control activity and with a simulation module to perform simulation with the apparatus of **Brown et al.** that included at least one of the control modules being created to communicate with the further module within the device separated from the distributed controller to perform a control activity. The artisan would have been motivated because that would allow at least one of the control modules being created to communicate with a further module in a device separated from the distributed controller to perform a control activity; and allow the devices made by different manufacturers to interoperate, the process control to be decentralized and the distributed control systems to be simplified.

Leibold teaches that the controller application when executed on the distributed controller implements the one of the control modules during operation of the distributed process control system (CL1, L33-35; CL1, L38-41; CL10, L7-13). **Leibold** does not expressly teach that the controller application when executed on the distributed controller implements the one of the control modules during operation of the distributed process control system to communicate with the further module to perform the control activity. **Brown et al.** teaches that the controller application when executed on the distributed controller implements the one of the control modules during operation of the distributed process control system to communicate with the further module to perform the control activity (CL2, L1-25), as that allows devices made by

different manufacturers to interoperate, the process control to be decentralized and the distributed control systems to be simplified (Col 2, Lines 1- 14; Lines 14-25). It would have been obvious to one of ordinary skill in the art at the time of Applicants' invention to modify the apparatus of **Leibold** with the apparatus of **Brown et al.** that included the controller application when executed on the distributed controller implementing the one of the control modules during operation of the distributed process control system to communicate with the further module to perform the control activity. The artisan would have been motivated because that would allow devices made by different manufacturers to interoperate, the process control to be decentralized and the distributed control systems to be simplified.

Leibold teaches that the controller application when executed on the computer causes execution of the one of the control modules and the further module within the computer to simulate the operation of the one of the control modules to thereby simulate operation of the distributed process control system (CL2, L20-23; CL2, L49-52; CL2, L54-67; CL3, L2-8; CL3, L29-45; CL4, L53-56; Fig. 3A, Item 205; CL6, L42-45; CL6, L57 to CL7, L4; CL7, L5-10; CL8, L39-45; CL9, L19-30; CL10, L37-54). **Leibold** does not expressly teach that the controller application when executed on the computer causes execution of the one of the control modules and the further module within the computer to simulate the operation of the one of the control modules including **simulating communicating with the further module**. **Brown et al.** teaches execution of the one of the control modules and the further module within the computer including communicating with the further module (CL2, L1-25), as that allows devices made by different manufacturers to interoperate, the process control to be decentralized and the distributed control systems to be simplified (Col 2, Lines 1- 14; Lines 14-25). It would have

been obvious to one of ordinary skill in the art at the time of Applicants' invention to modify the apparatus of **Leibold** that included the controller application when executed on the computer causing execution of the one of the control modules and the further module within the computer to simulate the operation of the one of the control modules to thereby simulate operation of the distributed process control system with the apparatus of **Brown et al.** that included execution of the one of the control modules and the further module within the computer including communicating with the further module. The artisan would have been motivated because that would allow the controller application when executed on the computer causing execution of the one of the control modules and the further module within the computer to simulate the operation of the one of the control modules **including simulating communicating with the further module**; and that would allow devices made by different manufacturers to be simulated.

(9.2) As per Claim 6, **Leibold** and **Brown et al.** teach the apparatus of claim 1. **Leibold** teaches that the configuration application when executed on the user workstation or the computer creates a further control module (this is an updated version of the original control module) for execution within the distributed controller during operation of the distributed process control system (CL3, L47-59; Fig. 2, Item 250; CL9, L53-62; CL10, L7-13; CL10, L17-20).

(9.3) As per Claim 7, **Leibold** and **Brown et al.** teach the apparatus of claim 1. **Leibold** teaches that the configuration application when executed, creates the further module to be executed within one of the field devices communicatively connected to the distributed

controller during the operation of the distributed process control system (CL3, L47-59; Fig. 2, Item 250; CL9, L53-62; CL10, L7-13; CL10, L17-20).

(9.4) As per Claim 8, **Leibold** and **Brown et al**. teach the apparatus of claim 1. **Leibold** teaches that the apparatus further includes a simulation application stored in the memory of the computer which when executed on the processing unit of the computer, communicates with the controller application within the computer to simulate the operation of the distributed process control system (CL2, L49-52; CL2, L54-67; CL3, L2-8; CL9, L19-30).

(9.5) As per Claim 10, **Leibold** and **Brown et al**. teach the apparatus of claim 1. **Leibold** teaches the controller application executed on the computer (CL2, L49-52; CL2, L54-67). **Leibold** does not expressly teach that the controller application when executed on the computer communicates with a further controller that is of a different type than the distributed controller of the distributed process control system. **Brown et al**. teaches that the controller application when executed on the computer communicates with a further controller that is of a different type than the distributed controller of the distributed process control system (CL2, L1-25), as that allows devices made by different manufacturers to interoperate, the process control to be decentralized and the distributed control systems to be simplified (CL2, L14-18). It would have been obvious to one of ordinary skill in the art at the time of Applicants' invention to modify the apparatus of **Leibold** with the apparatus of **Brown et al**. that included the controller application when executed on the computer communicating with a further controller that is of a different type than the distributed controller of the distributed process control system. The artisan

would have been motivated because that would allow at least one of the control modules being created to communicate with a further module in a device separated from the distributed controller to perform a control activity; and allow the devices made by different manufacturers to interoperate, the process control to be decentralized and the distributed control systems to be simplified.

(9.6) As per Claim 11, **Leibold** and **Brown et al**. teach the apparatus of claim 10. **Leibold** teaches the apparatus further including a viewing application stored in the memory of the computer which, when executed on the processing unit of the computer, communicates with the controller application and uses a user interface to display information (CL4, L5-10).

Leibold does not expressly teach a viewing application stored in the memory of the computer which, when executed on the processing unit of the computer, communicates with the controller application and uses a user interface to display information sent from the further controller. **Brown et al**. teaches execution of the one of the control modules within the computer including communicating with the further module (CL2, L1-25), as that allows devices made by different manufacturers to interoperate, the process control to be decentralized and the distributed control systems to be simplified (Col 2, Lines 1- 14; Lines 14-25). It would have been obvious to one of ordinary skill in the art at the time of Applicants' invention to modify the apparatus of **Leibold** that included the apparatus further including a viewing application stored in the memory of the computer which, when executed on the processing unit of the computer, communicated with the controller application and used a user interface to display information

with the apparatus of **Brown et al.** that included execution of the one of the control modules within the computer including communicating with the further module. The artisan would have been motivated because that would allow a viewing application stored in the memory of the computer which, when executed on the processing unit of the computer, to communicate with the controller application and use a user interface to display information sent from the further controller; and that would allow devices made by different manufacturers to be simulated.

(9.7) As per Claims 12, 17 and 18, these are rejected based on the same reasoning as Claims 1, 7 and 8, supra. Claims 12, 17 and 18 are method claims reciting the same limitations as Claims 1, 7 and 8, as taught throughout by **Leibold** and **Brown et al.**

Claims 2, 3, 13 and 14 are rejected under 35 U.S.C. 103(a) as being unpatentable over **Leibold** (U.S. Patent 5,818,736) in view of **Brown et al.** (U.S. Patent 6,377,859), and further in view of **Admitted prior art**.

(9.8) As per Claim 2, **Leibold** and **Brown et al.** teach the apparatus of claim 1. **Leibold** teaches the apparatus further including a viewing application stored in the memory of the computer to be executed on the processing unit of the computer, wherein the viewing application when executed on the computer uses the user interface to display information pertaining to the one of the control modules to a user (CL4, L5-10).

Leibold does not expressly teach that the configuration application when executed on the computer creates a user interface for use in displaying information to a user. **Admitted prior art** teaches that the configuration application when executed on the computer creates a user interface for use in displaying information to a user (Page 2, L17-19), as that enables changes to be made to the user interface and the user interfaces used by the viewing applications to be tested (Page 8 describing prior art Fig. 1, L22-26). It would have been obvious to one of ordinary skill in the art at the time of Applicants' invention to modify the apparatus of **Leibold** with the apparatus of **Admitted prior art** that included the configuration application when executed on the computer creating a user interface for use in displaying information to a user. The artisan would have been motivated because that would enable changes to be made to the user interface and the user interfaces used by the viewing applications to be tested.

(9.9) As per Claim 3, **Leibold** and **Brown et al**. teach the apparatus of claim 1. **Leibold** does not expressly teach that the apparatus further includes a configuration database application stored in the memory of the computer to be executed on the processing unit of the computer, wherein the configuration database application when executed on the computer, communicates with the controller application within the computer to manage a configuration database. **Admitted prior art** teaches that the apparatus further includes a configuration database application stored in the memory of the computer to be executed on the processing unit of the computer (Page 2, L29 to Page 3, L3; Page 4, L21-24), wherein the configuration database application when executed on the computer, communicates with the controller application within the computer to manage a configuration database (Page 8 describing prior art Fig. 1, L12-14), as

that would reduce the amount of hardware required by designing the system so that the configuration database application runs on the same PC as the control application and the viewing application (Page 4, L21-24). It would have been obvious to one of ordinary skill in the art at the time of Applicants' invention to modify the apparatus of **Leibold** with the apparatus of **Admitted prior art** that included the apparatus further including a configuration database application stored in the memory of the computer to be executed on the processing unit of the computer, wherein the configuration database application when executed on the computer, communicates with the controller application within the computer to manage a configuration database. The artisan would have been motivated because that would reduce the amount of hardware required by designing the system so that the configuration database application runs on the same PC as the control application and the viewing application.

(9.10) As per Claims 13 and 14, these are rejected based on the same reasoning as Claims 2 and 3, supra. Claims 13 and 14 are method claims reciting the same limitations as Claims 2 and 3, as taught throughout by **Leibold, Brown et al.** and **Admitted prior art.**

Claims 4, 5, 15 and 16 are rejected under 35 U.S.C. 103(a) as being unpatentable over **Leibold** (U.S. Patent 5,818,736) in view of **Brown et al.** (U.S. Patent 6,377,859), and further in view of **Bowling** (PCT WO 97/45778).

(9.11) As per Claim 4, **Leibold** and **Brown et al.** teach the apparatus of claim 1. **Leibold** does not expressly teach that the controller application includes an execution rate

parameter specifying the rate of execution of the one of the control modules within the computer. **Bowling** teaches that the controller application includes an execution rate parameter specifying the rate of execution of the one of the control modules within the computer (abstract; Page 2, Para 2; Page 4, Para 2), as that facilitates running the control procedures of the plant at a rate faster or slower than real time and the design and test of a part or the overall control of the industrial plant (Page 2, Para 2) and design, test and verification of various control system strategies in a comprehensive manner using appropriate simulation models (Page 4, Para 3). It would have been obvious to one of ordinary skill in the art at the time of Applicants' invention to modify the apparatus of **Leibold** with the apparatus of **Bowling** that included the controller application including an execution rate parameter specifying the rate of execution of the one of the control modules within the computer. The artisan would have been motivated because that would facilitate running the control procedures of the plant at a rate faster or slower than real time and the design and test of a part or the overall control of the industrial plant and design, test and verification of various control system strategies in a comprehensive manner using appropriate simulation models.

(9.12) As per Claim 5, **Leibold, Brown et al**. and **Bowling** teach the apparatus of claim 4. **Leibold** does not expressly teach that the execution rate parameter can be set to be greater than or less than a real time execution rate of the one of the control modules when the one of the control modules is executed within the distributed controller of the distributed process control system. **Bowling** teaches that the execution rate parameter can be set to be greater than or less than a real time execution rate of the one of the control modules when the one of the control

modules is executed within the distributed controller of the distributed process control system (Page 2, Para 2), as that would allow the design, test and verification of control system strategies in a more comprehensive manner using appropriate simulation models (Page 4, Para 3). It would have been obvious to one of ordinary skill in the art at the time of Applicants' invention to modify the apparatus of **Leibold** with the apparatus of **Bowling** that included the execution rate parameter to be set to be greater than or less than a real time execution rate of the one of the control modules when the one of the control modules was executed within the distributed controller of the distributed process control system. The artisan would have been motivated because that would allow the design, test and verification of control system strategies in a more comprehensive manner using appropriate simulation models.

(9.13) As per Claims 15 and 16, these are rejected based on the same reasoning as Claims 4 and 5, supra. Claims 15 and 16 are method claims reciting the same limitations as Claims 4 and 5, as taught throughout by **Leibold, Brown et al.** and **Bowling.**

Claim 9 is rejected under 35 U.S.C. 103(a) as being unpatentable over **Leibold** (U.S. Patent 5,818,736) in view of **Brown et al.** (U.S. Patent 6,377,859), and further in view of **Admitted prior art** and **Santoline et al.** (PCT WO 97/38362).

(9.14) As per Claim 9, **Leibold** and **Brown et al.** teach the apparatus of claim 1. **Leibold** does not expressly teach that the controller application when executed within the distributed controller, communicates with the field devices through an input/output device.

Admitted prior art teaches that the controller application when executed within the distributed controller, communicates with the field devices through an input/output device (Fig. 1, Item 16), because as per **Santoline et al.** that would allow the controller to receive sensor signals from the field devices and send control signals generated by the controller modules to the filed devices (Page 1, L9-13). It would have been obvious to one of ordinary skill in the art at the time of Applicants' invention to modify the apparatus of **Leibold** with the apparatus of **Admitted prior art** that included the controller application when executed within the distributed controller, communicating with the field devices through an input/output device. The artisan would have been motivated because that would allow the controller to receive sensor signals from the field devices and send control signals generated by the controller modules to the filed devices.

Claims 19-21 are rejected under 35 U.S.C. 103(a) as being unpatentable over **Leibold** (U.S. Patent 5,818,736) in view of **Brown et al.** (U.S. Patent 6,377,859) and further in view of **Brown et al.** (U.S. Patent 6,192,281).

(9.15) As per Claim 19, **Leibold** teaches an apparatus for use in conjunction with a distributed process control system having a user workstation remotely located from a distributed controller that controls one or more field devices using control modules (CL1, L24-27; CL1, L33-35; CL1, L38-41; Fig. 3A and 3B); the apparatus comprising:

a computer having a memory and a processing unit (Fig. 3A; Fig. 3B, Items 370, 375 and 385);

a display connected to the computer (Fig 3A Item 205);

a controller application stored in the memory of the computer (CL1, L24-26; CL2, L49-52; CL2, L54-67; CL3, L2-8);

wherein the controller application when executed on the distributed controller implements a control module during operation of the distributed process control system (CL1, L33-35; CL1, L38-41; CL10, L7-13); and

a viewing application stored in the memory of the computer which when executed on the processing unit of the computer, communicates with the controller application and uses the display to display information (CL4, L5-10).

Leibold does not expressly teach that the controller application when executed on the computer communicates with a further controller that uses a different communication protocol than the distributed controller of the distributed process control system. **Brown et al.** '281 teaches that the controller application when executed on the computer (simulation model) communicates with a further controller that uses a different communication protocol than the distributed controller of the distributed process control system (CL1, L56-57; CL2, L10-13; CL2, L18-24; CL3, L4-16; CL4, L12-22), as that enables field devices made by different manufacturers to be used together within the same process control network; each process control device has the capability to perform a control function and to communicate with other process control devices using a standard open communication protocol (CL1, L59-61; CL 2, L10-13). It would have been obvious to one of ordinary skill in the art at the time of Applicants' invention to modify the apparatus of **Leibold** with the apparatus of **Brown et al.** '281 that included the controller application when executed on the computer (simulation model) communicating with a

further controller that uses a different communication protocol than the distributed controller of the distributed process control system. The artisan would have been motivated because that would enable field devices made by different manufacturers to be used together within the same process control network; each process control device would have the capability to perform a control function and to communicate with other process control devices using a standard open communication protocol.

Leibold does not expressly teach a viewing application stored in the memory of the computer which when executed on the processing unit of the computer, communicates with the controller application and uses the display to display information sent from the further controller. **Brown et al**. teaches execution of the one of the control modules within the computer including communicating with the further module (CL2, L1-25), as that allows devices made by different manufacturers to interoperate, the process control to be decentralized and the distributed control systems to be simplified (CL 2, L1- -25). It would have been obvious to one of ordinary skill in the art at the time of Applicants' invention to modify the apparatus of **Leibold** that included the apparatus including a viewing application stored in the memory of the computer which when executed on the processing unit of the computer, communicated with the controller application and used the display to display information with the apparatus of **Brown et al**. that included execution of the one of the control modules within the computer including communicating with the further module. The artisan would have been motivated because that would allow a viewing application stored in the memory of the computer which when executed on the processing unit of the computer, to communicate with the controller application and use the display to display

information sent from the further controller; and that would allow devices made by different manufacturers to be simulated.

(9.16) As per Claim 20, **Leibold, Brown et al.** and **Brown et al**. '281 teach the apparatus of claim 19. **Leibold** does not expressly teach the apparatus further including an interface connected between the further controller and the controller application. **Brown et al.** teaches the apparatus further including an interface connected between the further controller and the controller application (CL 2, L14-25), as that allows devices made by different manufacturers to communicate with one another and interoperate to effect decentralized control within a process (CL 2, L1-25). It would have been obvious to one of ordinary skill in the art at the time of Applicants' invention to modify the apparatus of **Leibold** with the apparatus of **Brown et al.** that included the apparatus further including an interface connected between the further controller and the controller application. The artisan would have been motivated because that would allow devices made by different manufacturers to communicate with one another and interoperate to effect decentralized control within a process.

(9.17) As per Claim 21, **Leibold, Brown et al.** and **Brown et al**. '281 teach the apparatus of claim 20. **Leibold** does not expressly teach the apparatus wherein the interface is an OPC interface. **Brown et al.** teaches the apparatus wherein the interface is an OPC interface (CL 2, L14-25), as that allows devices made by different manufacturers to communicate with one another and interoperate to effect decentralized control within a process (CL 2, L1-25). It would have been obvious to one of ordinary skill in the art at the time of Applicants' invention to

modify the apparatus of **Leibold** with the apparatus of **Brown et al.** that included the apparatus wherein the interface is an OPC interface, as that would allow devices made by different manufacturers to communicate with one another and interoperate to effect decentralized control within a process.

(10) Response to Argument

Appellants' arguments filed with respect to claims 1-21 in the Appeal Brief have been fully considered and they are not persuasive. Examiner submits to the Board that the rejections applied are proper and should be maintained.

(10.1) Response to Appellants' Arguments regarding claim rejections under 35 USC 103(a)

(10.1.1) Lack of *prima facie* case of obviousness

Appellants' Arguments

The Examiner has failed to provide factual support for the rejections sufficient to establish *a prima facie* case of obviousness. To establish *a prima facie* case of obviousness, three basic criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. Second, there must be a reasonable expectation of success. Finally, the prior art reference (or references when combined) must teach or suggest all the claim limitations. The teaching or suggestion to make the claimed combination and the

reasonable expectation of success must both be found in the prior art. To reach a proper determination under 35 U.S.C. § 103(a), the examiner must step backward in time and into the shoes worn by the hypothetical "person of ordinary skill in the art" when the invention was unknown and just before it was made. In view of all factual information, the examiner must then make a determination whether the claimed invention "as a whole" would have been obvious at that time to that person.

Examiner's response

The appellants' invention comprises **three basic elements**:

1. A system or a method that simulates, **on a single computer**, the operation of and communication interactions between various process control components of a distributed process control network.

2. At least one of the control modules is created **to communicate with the further module** within the device separated from the distributed controller to perform a control activity; the controller application when executed on the distributed controller implements the one of the control modules during operation of the distributed process control system **to communicate with the further module** to perform the control activity; and execution of the one of the control modules and **the further module within the computer** including communicating with the further module.

3. A system having a controller application which is designed to operate in a first type of a distributed controller but which can also act outside of the distributed controller as part of an interface between a user interface or display and a second and different type of controller (e.g., one using a different communication protocol).

Independent claims 1 and 12 comprise elements 1 and 2 above. Independent claim 19 comprises elements 1, 2 and 3 above.

Leibold teaches that the controller application when executed on a computer causes execution of the one of the control modules and the further module within the computer to simulate the operation of the one of the control modules to thereby simulate operation of the distributed process control system (CL2, L20-23; CL2, L49-52; CL2, L54-67; CL3, L2-8; CL3, L29-45; CL4, L53-56; Fig. 3A, Item 205; CL6, L42-45; CL6, L57 to CL7, L4; CL7, L5-10; CL8, L39-45; CL9, L19-30; CL10, L37-54). Therefore, **Leibold** teaches simulation of different control modules of the distributed process control system **on a single computer**.

Brown et al. (Brown I) teaches that at least one of the control modules is created **to communicate with the further module** within the device separated from the distributed controller to perform a control activity (CL2, L1-25), as that allows devices made by different manufacturers to interoperate, the process control to be decentralized and the distributed control systems to be simplified (CL2, L14-18). Brown et al. teaches that the controller application when executed on the distributed controller implements the one of the control modules during operation of the distributed process control system **to communicate with the further module** to perform the control activity (CL2, L1-25). Brown et al. teaches execution of the one of the control modules and the further module within the computer including communicating with the further module (CL2, L1-25). The Examiner's use of **Brown et al.** is consistent and similar to

the use of **further controller** by the Applicants as described in the specification Page 10, L18-26.

In this regard, it is pointed out that the distributed controllers comprise **various control logic implemented on various controller processors** (ASIC, PAL, PLA, FPGA etc) for controlling numerous field devices. The control logic could be of different types – PID controllers, fuzzy logic controller, neural network controller etc., using various combinations of mathematical logic coded into software. **Leibold** teaches simulating such a distributed controller on a single computer. **Leibold** does not explicitly teach a **further type of controller** and communicating with the further type of controller. This is taught by **Brown et al.** (Brown I). The motivation for selecting a further controller is that it allows devices made by different manufacturers to interoperate, the process control to be decentralized and the distributed control systems to be simplified, as taught by **Brown et al.** The motivation for simulating a **further type of controller** and communicating with the further type of controller is same as the motivation for simulating the distributed controller on a single computer – to design and test various control modules in an environment away from the distributed controller, and when the distributed controller is not yet designed and built as taught by **Leibold.**

Brown et al. '281 (Brown II) teaches that the controller application when executed on the computer (simulation model) communicates with a further controller that uses a different communication protocol than the distributed controller of the distributed process

control system (CL1, L56-57; CL2, L10-13; CL2, L18-24; CL3, L4-16; CL4, L12-22), because that enables field devices made by different manufacturers to be used together within the same process control network; each process control device has the capability to perform a control function and to communicate with other process control devices using a different communication protocol (CL1, L59-61; CL 2, L10-13). The motivation for combing **Brown et al. '281** (Brown II) with **Leibold** and **Brown et al.** (Brown I) is provided by **Brown et al. '281**.

Therefore the Examiner has provided factual support for the rejections sufficient to establish *a prima facie* case of obviousness

(10.1.2) General inapplicability of Leibold and Brown I to Claims 1 and 12

Appellants' Arguments

Independent Claims 1 and 12 are generally directed to a system or a method that simulates, **on a single computer**, the operation of and communication interactions between various process control components of a distributed process control network because it simplifies testing in an environment in which it is sometimes difficult to correctly create the appropriate process control modules.

Leibold teaches that simulation of a process control network must be accomplished on a logic-point-by-logic-point basis; thus, even if it were possible to modify the Leibold process control system to be a distributed system having control modules executed in different devices, the basic teaching of Leibold **would require multiple simulation computers**, that is, one simulation computer for each logic point, to simulate this system; this teaching is contrary to

Claims 1 and 12 which recite simulating, **on a single computer**, process control modules which are designed to be implemented in different devices when used for their intended purpose as part of a distributed process control system.

Examiner's response

1. Liebold, CL1, L38-41 state, "the **control systems** include a plurality of modules, each having its own hardware, software and firmware, linked together by a communication bus thereby resulting in a **distributed system"**.

2. Liebold, CL3, L29-45 state, "the real time process control system comprises circuitry to contain the logic block pattern; conventional logic devices such as programmable logic arrays, and application specific integrated circuits are employed to accomplish simultaneous control of multiple devices removing dependencies that occur when data is required to be processed serially; the real time process control system uses PLAs, ASICs and other firmware and hardware devices to store the logic block pattern; because testing computer of the present invention is **not constrained to operate in real time**, the logic block pattern can be stored in computer memory and **executed serially**".

3. Liebold, CL4, L53-56 state, "Fig 3A illustrates a conventional computer that provides the environment within which the present invention may be suitably implemented". See Fig. 3A, Item 205.

4. Liebold, CL6, L42-45 state, "process controller 105 in whole or in part, may be programmable to function as a logic point; the logic point comprises a plurality of associated logic blocks".

5. Liebold, CL6, L57 to CL7, L4 state, “Honeywell’s TDC 3000 Industrial Automation System **logic point is suitably configurable to include up to 24 logic blocks** that represent the logic components; a logic block may include any suitably arranged programmable processing circuitry, including PALs, PLAs, DSPs, FPGAs, ASICs, LSIs, VLSIs or other embodiments to form various types of circuitry comprising logic blocks”.

6. Liebold CL7, L5-10 state, “while the illustrated embodiment includes but a single plant control network 100 and process controller 105, alternate embodiment of process control system 10 may suitably include a multitude of process controllers associated with plant control network 100”.

7. Liebold CL8, L39-45 state, “an exemplary method of simulating signal flow through a logic flow pattern of exemplary real time process control system 10 of Fig. 1; the exemplary logic block pattern may represent a single logic block, a plurality of logic blocks or a logic point; exemplary method may suitably be implemented and operated within **a computer designated 205**”.

8. Liebold, CL10, L37-54 state, “the real time process control system comprises circuitry to contain the logic block pattern; conventional logic devices such as PALs, PLAs, DSPs, FPGAs, ASICs, LSIs, VLSIs and the like are employed to accomplish simultaneous control of multiple devices removing dependencies that occur when data is required to be processed serially; the real time process control system may also use PALs, PLAs, DSPs, FPGAs, ASICs, LSIs, VLSIs and other firmware and hardware devices to store the logic block pattern; because testing computer of the present invention is not constrained to operate in real time, the logic block pattern can be stored in computer memory and executed serially”.

The above quotations from Liebold clearly and unambiguously state that a logic point comprises several logic blocks, each implemented in its own hardware or software. The single computer simulates several logic blocks of a logic point. The single computer may also simulate multiple logic points of multiple controllers.

(10.1.3) Use of Brown I with Liebold

Appellants' Arguments

Brown I discloses nothing about and is not concerned with simulating the operation of the distributed process control system disclosed therein. No combination of Leibold and Brown I would produce the invention recited by claims 1 and 12. While Brown I discloses a distributed process control system that includes control modules disposed in various and different devices and in which the control modules communicate with one another during operation of the process control system, Brown I provides no disclosure what-so-ever pertaining to any manner of simulating such a process control system. The prior art simulation methods for distributed process control systems, such as that of Brown I, required the use of multiple computer and hardware devices to assure that all of the communications between various devices within the process plant were being correctly simulated.

Examiner's response

The Examiner has not stated in the rejections of claim 1 and 12 that Brown I teaches simulation of distributed process control system. The Examiner used Brown I to show that Brown I teaches a further module separated from the distributed controller. Brown et al. teaches that at least one of the control modules is created to communicate with the further module within the device separated from the distributed controller to perform a control activity (CL2, L1-25), as that allows devices made by different manufacturers to interoperate, the process control to be decentralized and the distributed control systems to be simplified (CL2, L14-18). Brown et al. teaches that the controller application when executed on the distributed controller implements the one of the control modules during operation of the distributed process control system to communicate with the further module to perform the control activity (CL2, L1-25). Brown et al. teaches execution of the one of the control modules and the further module within the computer including communicating with the further module (CL2, L1-25). The Examiner's use of Brown et al. is consistent and similar to the use of further controller by the Applicants as described in the specification Page 10, L18-26.

(10.1.4) Specific lack of teachings or suggestions in Liebold

Appellants' Arguments

The cited portions of Leibold begin with a discussion involving iteratively **modifying control rules** based on a comparison between a simulated output and an expected output to remove undesirable interactions. The next cited portion refers to **defining a rule base of control rules** and constituting a logic block pattern, and beginning a simulation process. A discussion of element 220 of Figure 2 indicates that a user **defines a rule base containing control rules** and

constituting a logic block pattern. Other portions of Leibold cited by the Examiner describe typical computer components, further details of the iterative process of **modifying the control rules** involving determining whether the difference between the simulated and expected output is acceptable, and that the tested logic block pattern may be used in the actual process control system to decrease detrimental interactions in the design of a process control system. The closest that these cited portions of Leibold come to describing the elements of Claim 1 is a note that the logic block pattern may represent devices comprising an **actual logic block that could be configured** in a similar manner in the actual controller. At no time does any of the cited portions of Leibold teach or suggest in any way **creating one or more control modules** for execution by the distributed controller and a further module for execution by a device separated from the distributed controller. Moreover, the cited portions of Leibold fail to teach or suggest that a **control module is created to communicate with the further module** within the device separated from the distributed controller to perform a control activity.

Examiner's response

The Examiner takes the position that **defining the rule base of the control rules** is same as creating the **control modules**. The control module contains the control rules such as PID control scheme, the Fuzzy logic control rules or the neural network control scheme. The further module is nothing more than a different controller using a different set of mathematical logic as control logic embedded in a further module software. All control modules are created to communicate with other control modules using appropriate communication scheme in the distributed controller. While Liebold does not explicitly teach further control module and

communication with further control module, **Brown et al.** teaches the further control module and communication with the further control module, as explained in Praagraph 10.1.1 above.

Appellants' Arguments

The Examiner argues that at least one of the-control modules is created to communicate with a user interface module to perform a control activity. However, the cited portion of Leibold discusses that the testing system includes a visual display for displaying the logic block pattern as a collection of associated graphical block elements and that those skilled in .the art familiar with GUIs and their use in control environments. The Examiner's reliance on this portion of Leibold would seem to require that the logic block pattern being displayed is itself responsible for supporting communication between itself and the display.

Examiner's response

The Examiner takes the position that when the distributed controller test system is provided with the graphical user interface, the GUI would be used by the user to input the parameters for the control logic and thus design the control module. The communication between the GUI and the configuration system for designing the control module under user control would be provided.

(10.1.5) Lack of motivation to combine Liebold and Brown I

Appellants' Arguments

The Examiner has simply failed to point to any actual motivation in either of Leibold or Brown I to make the claimed combination. The Examiner admits that Leibold does not suggest simulating a process control system having different control modules disposed in different computing or logic devices. The Examiner's recitation of a motivation in Brown I has nothing to do with advantages obtained by ***a simulation*** system.

Examiner's response

The Examiner has shown that Liebold teaches simulating a process control system having different control modules disposed in different computing or logic devices **on a single computer** as shown in Paragraph 10.1.1 and 10.1.2 above. The Brown I reference is used only to include **a further module** (of a **different type)** and communicating with the further module.

(10.1.6) Dependent claims.

Appellants' Arguments

Claims 1 and 12 have been shown above to be allowable. Therefore, dependent Claims 6-8, 10-11 and 17-18 are patentable as depending from an allowable base claim and as defining further distinctions over the cited references.

Examiner's response

The Examiner has shown in rejection of the dependent claims that both the independent claims and the dependent claims are taught by the references and therefore are not allowable.

(10.1.7) Rejection of Claims 19-21 as Obvious Over Leibold in View of Brown I and Brown II

Appellants' Arguments

Claim 19 basically recites a system having a controller application which is designed to operate in a first type of a distributed controller but which can also act outside of the distributed controller as part of an interface between a user interface or display and a second and different type of controller (e.g., one using a different communication protocol) that may be, for example, operating within an actual process plant. The Examiner cites Brown II for this feature. However, contrary to the Examiner's assertion, Brown II does not disclose a system having multiple process controller applications that use different communication or computer protocols and that communicate with one another.

Dependent Claims 20-21 depend from independent Claim 19, shown above to be allowable. Therefore, dependent Claims 20-21 are patentable as depending from an allowable base claim and as defining further distinctions over the cited references.

Examiner's response

Brown et al. '281 teaches that the controller application when executed on the computer (simulation model) communicates with a further controller that uses a different communication

protocol than the distributed controller of the distributed process control system (CL1, L56-57; CL2, L10-13; CL2, L18-24; CL3, L4-16; CL4, L12-22), as that enables field devices made by different manufacturers to be used together within the same process control network; each process control device has the capability to perform a control function and to communicate with other process control devices using a standard open communication protocol (CL1, L59-61; CL 2, L10-13).

One of ordinary skill in the art will know that in order to implement a controller with a different protocol, the processor should implement the interface logic that is required to communicate with that controller using that different communication protocol. This is the support module that the applicants are talking about. The Brown II reference allows using controllers with different protocol, which implies the necessary software modules to communicate with that controller are available. If so, there is no restriction on using controllers with different protocol in the same distributed controller.

The Examiner has shown in rejection of the dependent claims that both the independent claims and the dependent claims are taught by the references and therefore are not allowable.

(10.1.8) Dependent claims.

Appellants' Arguments

Claims 1 and 12 have been shown above to be allowable. Therefore, dependent Claims 2-5, 9 and 13-16 are patentable as depending from an allowable base claim and as defining further distinctions over the cited references.

Examiner's response

The Examiner has shown in rejection of the dependent claims that both the independent claims and the dependent claims are taught by the references and therefore are not allowable.

(11) Related Proceeding(s) Appendix

No decision rendered by a court or the Board is identified by the examiner in the Related Appeals and Interferences section of this Examiner's Answer.

For the above reasons, it is believed that the rejections should be sustained.

Respectfully submitted,

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